

09/14/00

jc922 U.S. PTO

09-15-00

A

Please type a plus sign (+) inside this box → ☐Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

**UTILITY
PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 61311008

First Inventor or Application Identifier Andrews, Greg

Title Anti-Icing Formulations

Express Mail Label No. EK599480649US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents

ADDRESS TO:Assistant Commissioner for Patents
Box Patent Application
Washington, DC 202311. ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original, and a duplicate for fee processing)2. ☒ Specification [Total Pages 22]
(preferred arrangement set forth below)

- Descriptive title of the invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the invention
- Brief Summary of the invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

3. ☐ Drawing(s) (35 U.S.C. 113) [Total Sheets ☐4. Oath or Declaration [Total Pages ☐

- a. ☒ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]
- i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting
inventor(s) named in the prior application,
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from which a
copy of the oath or declaration is supplied under Box 4b, is
considered to be part of the disclosure of the accompanying
application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)

- a. ☐ Computer Readable Copy
- b. ☐ Paper Copy (identical to computer copy)
- c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS8. ☐ Assignment Papers (cover sheet & document(s))9. ☐ 37 C.F.R. §3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)10. ☐ English Translation Document (if applicable)11. ☐ Information Disclosure ☐ Copies of IDS
Statement (IDS)/PTO-1449 Citations12. ☐ Preliminary Amendment13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)14. ☒ * Small Entity ☐ Statement filed in prior application.
Statement(s) Status still proper and desired
(PTO/SB/09-12)15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)16. ☒ Other: Credit Card Payment Form* A new statement is required to be entitled to pay small entity fees, except
where one has been filed in a prior application and is being relied upon

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. _____

Prior application information: Examiner _____ Group / Art Unit _____

18. CORRESPONDENCE ADDRESS☐ Customer Number or Bar Code Label

(Insert Customer No. or Attach bar code label here)

or ☒ Correspondence address belowName Barry E. Kaplan, Esq.
Hughes & KaplanAddress 2415 West Park Place Boulevard
Suite BCity Stone Mountain

State

Georgia

Zip Code

30087Country United States

Telephone

770-469-8887

Fax

770-469-9099

Name (Print/Type)

Barry E. Kaplan

Registration No. (Attorney/Agent)

38,934

Signature

Barry E. Kaplan

Date

09/14/2000

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any
comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office,
Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents,
Box Patent Application, Washington, DC 20231.

61311008.012

ORIGINAL

PTO/SB/17 (1/98)
Approved for use through 9/30/2000 OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

FEE TRANSMITTAL

Patent fees are subject to annual revision on October 1.

These are the fees effective October 1, 1997.

Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12

Complete if Known

Application Number	
Filing Date	SEPTEMBER 14, 2000
First Named Inventor	Andrews, Greg
Examiner Name	
Group / Art Unit	
Attorney Docket No.	61311008

TOTAL AMOUNT OF PAYMENT (\$) 384.00

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to

Deposit Account Number
Deposit Account Name

☐ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17

☐ Charge the Issue Fee Set in 37 CFR 1.18 at the Mailing of the Notice of Allowance

2. ☒ Payment Enclosed:

☐ Check ☐ Money Order ☒ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
101 790	201 395	Utility filing fee	345
106 330	206 165	Design filing fee	
107 540	207 270	Plant filing fee	
108 790	208 395	Reissue filing fee	
114 150	214 75	Provisional filing fee	

SUBTOTAL (1) (\$) 345

2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid
16	-20** = 0	11	0
4	-3** = 1	39	39

**or number previously paid, if greater, For Reissues, see below

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
103 22	203 11	Claims in excess of 20	
102 82	202 41	Independent claims in excess of 3	
104 270	204 135	Multiple dependent claim, if not paid	
109 82	209 41	** Reissue independent claims over original patent	
110 22	210 11	** Reissue claims in excess of 20 and over original patent	

SUBTOTAL (2) (\$) 39.00

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or oath	
127 50	227 25	Surcharge - late provisional filing fee or cover sheet	
139 130	139 130	Non-English specification	
147 2,520	147 2,520	For filing a request for reexamination	
112 920*	112 920*	Requesting publication of SIR prior to Examiner action	
113 1,840*	113 1,840*	Requesting publication of SIR after Examiner action	
115 110	215 55	Extension for reply within first month	
116 400	216 200	Extension for reply within second month	
117 950	217 475	Extension for reply within third month	
118 1,510	218 755	Extension for reply within fourth month	
128 2,060	228 1,030	Extension for reply within fifth month	
119 310	219 155	Notice of Appeal	
120 310	220 155	Filing a brief in support of an appeal	
121 270	221 135	Request for oral hearing	
138 1,510	138 1,510	Petition to institute a public use proceeding	
140 110	240 55	Petition to revive - unavoidable	
141 1,320	241 660	Petition to revive - unintentional	
142 1,320	242 660	Utility issue fee (or reissue)	
143 450	243 225	Design issue fee	
144 670	244 335	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
123 50	123 50	Petitions related to provisional applications	
126 240	126 240	Submission of Information Disclosure Stmt	
581 40	581 40	Recording each patent assignment per property (times number of properties)	
146 790	246 395	Filing a submission after final rejection (37 CFR 1.129(a))	
149 790	249 395	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) _____

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$) 0.

SUBMITTED BY

Typed or Printed Name Barry E. Kaplan, Esq.

Signature

Barry E. Kaplan

Date

09/14/00

Complete (if applicable)

Reg. Number 38,934

Deposit Account User ID

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO Assistant Commissioner for Patents, Washington, DC 20231

61311008.011

PTO/5809 (10-96)

Approved for use through 10/31/99, OMB 0651-0031
Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(b))—INDEPENDENT INVENTOR**Docket Number (Optional)
61311008Applicant or Patentee: Greg R. Andrews; Robert S. Mendenhall

Application or Patent No.: _____

Filed or Issued: September 14, 2000Title: Anti-Icing Formulations

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

☒ the specification filed herewith with title as listed above.☐ the application identified above.☐ the patent identified above.

I have not assigned, granted, conveyed, or licensed, and am under no obligation under contract or law to assign, grant, convey, or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☒ No such person, concern, or organization exists.☐ Each such person, concern, or organization is listed below.

Separate verified statements are required from each named person, concern, or organization having rights to the invention averring to their status as small entities (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Greg R. Andrews

Robert S. Mendenhall

NAME OF INVENTOR

NAME OF INVENTOR

NAME OF INVENTOR

Signature of Inventor

Signature of Inventor

Signature of Inventor

Date

Date

Date

Burden Hour Statement: This form is estimated to take 0.3 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

61311008.010

5

APPLICATION FOR LETTERS PATENT
UNITED STATES OF AMERICA

10

Be it known that I, **Greg R. Andrews**, residing at 70
15 Home Avenue, Second Floor, Middletown, Connecticut, 06457,
and I, **Robert S. Mendenhall**, residing at 9 Brainerd Avenue,
Middletown, Connecticut, 06457, both being citizens of the
United States of America, have invented certain new and
useful improvements in

20

ANTI-ICING FORMULATIONS

25

of which the following is a specification.

30

INVENTOR'S REPRESENTATIVE:

35

Barry E. Kaplan, Esq.
The Law Firm of HUGHES & KAPLAN
2415 West Park Place Boulevard
Suite B
Stone Mountain, Georgia 30087
(770) 469-8887 - Voice
(770) 469-9099 - Facsimile
barry_kaplan@msn.com - email

40

TITLE:

ANTI-ICING FORMULATIONS

RELATED APPLICATIONS:

This non-provisional application claims the benefit of Provisional Application Serial No. 60/154,706, filed on September 18, 1999.

TECHNICAL FIELD

The present invention relates generally to anti-icing formulations; and, more specifically, to anti-icing and de-icing formulations produced from alcohol/polyol-based aqueous fluids, thickened by the combination of an acrylic emulsion and a water-swelling layered clay mineral. Optional formulations include the addition of a surfactant combination comprised of a first surfactant with an hydrophilic/ lipophilic balance ("HLB") ≤ 3 , coupled with a second surfactant with an HLB 19, and include the further optional addition of a water-activated polymer and other components. A second basic formulation describes a polyol-

based aqueous solution of polyvinyl alcohol with optional thickeners.

BACKGROUND OF THE INVENTION:

5 The problem of ice formation on surfaces is well known, and is addressed extensively in the prior art. There is still a need, however, for deicing/ anti-icing compositions which offer enhanced resistance to rain wash-off. Furthermore, there exists a need for effective deicing/
10 anti-icing compositions which may be applied using simple light-duty hand-held sprayers.

Accordingly, it is an object of the present invention to provide a first form of anti-icing compositions which are easily removable from surfaces to which they are applied,
15 and contain no polyvinyl alcohol, and to provide a second form that will set-up to form a rubber-like gel within several hours after mixing.

It is another object of the present invention to provide anti-icing compositions principally comprising an
20 aqueous solution of monohydroxy and/ or polyhydroxy alcohols, thickened with a combination of an acrylic emulsion polymer and a water-swellable, colloid-forming clay mineral.

It is still another object of the present invention to provide anti-icing compositions compatible with optional ingredients such as polyols, surfactants, pH-modifiers, friction-reducing agents, corrosion inhibiting agents, anti-oxidants, UV inhibitors, biocides, dyes, foam control agents, odor-modification agents, stabilizers, and the like.

It is yet another object of the present invention to provide anti-icing compositions that utilize non-toxic chemicals as freezing point depressants.

It is yet still another object of the present invention to provide anti-icing compositions having viscosity that may be adjusted for application of the composition through a variety of means.

BRIEF SUMMARY OF THE INVENTION:

The present invention provides substantial improvement to the art for a variety of applications. Formulations are described for compositions which may be applied using light-duty sprayers, yet still allow for higher viscosities, and, thereby, greater resistance to rain wash-off, than analogous prior-art formulations. Formulations are also described which provide enhanced resistance to water incursion. Formulations are further described for compositions

providing such an extreme level of resistance to wash-off that they are only suitable for applications where easy removal of the composition is not an issue.

Accordingly, anti-icing compositions are disclosed comprising an aqueous solution of monohydroxy and/ or polyhydroxy alcohols, thickened with a combination of an acrylic emulsion polymer and a water-swellaable, colloid-forming clay mineral. Optional additions include glycerine, and added surfactant combinations comprised of a first surfactant with an hydrophilic/ lipophilic balance ≤ 3 coupled with a second surfactant with an HLB 19. An example of such surfactant combination is a block copolymer of ethylene-oxide and propylene-oxide.

Further optional additions may include Teflon powder, graphite, pH-modifiers, corrosion inhibiting agents, anti-oxidants, UV inhibitors, biocides, dyes, foam control agents, odor-modification agents, stabilizers, and the like. Advantageously, the preferred formulations of the present invention utilize non-toxic chemicals as freezing point depressants.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

In describing the preferred and alternate embodiments of the present invention, specific terminology is employed for the sake of clarity. The invention, however, is not intended to be limited to the specific terminology so selected, and it is to be understood that each specific element includes all technical equivalents that operate in a similar manner to accomplish similar functions.

The present invention consists of formulations for anti-icing fluids. These fluids also have utility for deicing applications. The present formulations are of two basic types, which are most simply distinguished by the presence or lack of polyvinyl alcohol.

Type I Formulations:

The formulations of the first basic type are designed to be easily removable from surfaces to which they are applied, and contain no polyvinyl alcohol. These formulations are comprised of combinations of the following components:

A. Freezing point depressant: This component will typically comprise between 20 to 80 weight percent of the total composition. The following are preferred:

a) One, two, or three carbon alcohols (i.e., methyl, ethyl, and propyl alcohols). These alcohols provide economy, low viscosity, rapid evaporation, and are quite flammable.

5 b) Two or three carbon glycols (i.e., ethylene glycol or propylene glycol). These diols are viscous, odorless, slow evaporating, and non-flammable.

c) Glycerol (1,2,3-propanetriol). Glycerol (Glycerine) is very viscous, odorless, extremely slow
10 evaporating, and non-flammable. (For maximum viscosity and water resistance, these compositions should contain at least approximately 5% by weight glycerine).

d) Any combination of the above. The above
15 components blend easily to yield compositions with a combination of the above- mentioned properties.

B. Water: This component will typically comprise
between 20 to 80 weight percent of the total composition.
The water does not have to be distilled or purified,
although hard water may require pre-treatment or the
20 addition of a sequestrant.

C. Acrylic-based emulsion polymer or copolymer: This
component will typically comprise between 0.1 to 15 weight

percent of the total composition. Most preferred are associative, hydrophobically modified polymer emulsions.

D. Colloid-forming (water swellable) layered clay mineral: This component will typically comprise between 5 0.05 to 5 weight percent, and most typically between 0.1 to 2 weight percent of the total composition. Preferred are natural or synthetic hectorites, montmorillonites and bentonites, and of these, purified or synthetic hectorites are especially preferred.

10 E. Nonionic surfactant with an HLB in the range of 1 to 3: This component is optional, and will typically comprise between 0.1 to 3 weight percent, and most typically between 0.5 to 2.0 weight percent of the total composition.

15 F. Nonionic surfactant with an HLB of 19 or above: This component is optional, and will typically comprise between 0.01 to 1.0 weight percent, and most typically between 0.05 to 0.5 weight percent of the total composition.

20 G. Polymeric water-activated thickening agent: This component is optional, and will typically comprise between 0.01 to 10.0 weight percent, and most typically between 0.1 to 5.0 weight percent of the total composition. Preferred are polysaccharide thickeners, natural gum thickeners, marine algae colloids, and cellulose ether thickeners. Most

preferred is a polysaccharide known generically as Xanthan Gum.

H. pH adjusting agent: This component will typically comprise less than 0.5 weight percent of the total composition, and is, in any case, only required in an amount sufficient to adjust the pH upward to the range between 6 to 12, most preferably to between 7.5 to 10. Preferred are alkaline metal hydroxides and organic amine bases, although it may be advisable to avoid the use of tertiary amines as these can possibly interfere with the gel structure of these formulations.

I. Corrosion Inhibitors: These components are optional, and will typically comprise less than 1 weight percent of the total composition. Corrosion inhibitors useful as ingredients in alcohol/polyol based aqueous solutions are well known in the art, and selection may be made based upon the type of surfaces with which the present compositions are likely to come into contact, and how long and under what conditions they are likely to remain on that surface.

J. Powder lubricant: This component is optional, and is only used in compositions which are designed for applications such as locks or hinges, where it may be useful

to supplement the anti-icing function with one of lubrication. Preferred are graphite or Teflon powders, and the amounts will typically comprise between 0.1 to 10 weight percent of the total composition.

5 K. Miscellaneous additives: The composition may also contain various other functional ingredients such as anti-oxidants, UV inhibitors, biocides, dyes, foam control agents, odor-modification agents, stabilizers and the like. Each of these components will typically comprise less than
10 1.0 weight percent of the total composition.

Examples of Type I Formulations:

Some examples of compositions produced by the aforementioned first basic type formulations are as follows,
15 with the ingredients listed in approximate order of addition:

i. Slow-evaporating, non-toxic, viscous, thixotropic anti-icing fluid for application by trigger-type or other light-duty sprayers.

40 wt. %	Water
0.25 wt. %	LAPONITE® (synthetic hectorite clay: Laporte Industries, Ltd.)

0.75 wt. %	ALCOGUM® SL-70 (acrylic emulsion terpolymer: ALCO Chemical)
0.1 wt. %	PLURONIC® F108 (nonionic surfactant: BASF)
23 wt. %	Glycerine
20 wt. %	Propylene glycol
≈ 0.1 wt. %	AMP-95 (Aminomethyl propanol: Angus Chemical Co.)
15 wt. %	Isopropyl Alcohol
0.5 wt. %	PLURONIC® 31R1 (nonionic surfactant: BASF)
0.4 wt. %	Orange Oil 5 Fold (Frutarom-Meer Corporation)

ii. Viscous, thixotropic anti-icing fluid for use in automobile windshield washer reservoirs:

48.5 wt. %	Water
0.25 wt. %	LAPONITE® (synthetic hectorite clay: Laporte Industries, Ltd.)
0.5 wt. %	ALCOGUM® SL-70 (acrylic emulsion terpolymer: ALCO Chemical) Note: This ingredient is optional for windshield washer reservoir fluid.
0.05 wt. %	PLURONIC® F108 (nonionic surfactant: BASF)
15 wt. %	Ethylene glycol (substitute propylene glycol to produce a non-toxic product)
≈ 0.1 wt. %	AMP-95 (Aminomethyl propanol: Angus Chemical)

	Co.)
35 wt. %	Methanol (substitute isopropyl alcohol to produce a non-toxic product)
0.5 wt. %	PLURONIC® 31R1 (nonionic surfactant: BASF)
0.3 wt. %	Orange Oil 5 Fold (Frutarom-Meer Corporation) (Use when isopropyl alcohol is an ingredient.)

iii. Highly water-resistant, low-evaporation, non-toxic, anti-icing gels for application by hand-held spreaders or heavy-duty sprayers:

36 wt. %	Water
0.5 wt. %	LAPONITE® (synthetic hectorite clay: Laporte Industries, Ltd.)
10 wt. %	ALCOGUM® SL-70 (acrylic emulsion terpolymer: ALCO Chemical)
0.12 wt. %	PLURONIC® F108 (nonionic surfactant: BASF)
10 wt. %	Glycerine
42 wt. %	Propylene glycol
0.4 wt. %	KELZAN® (xanthan gum: Kelco Industrial Biopolymers)
1.2 wt. %	PLURONIC® 31R1 (nonionic surfactant: BASF)
≈ 0.2 wt. %	AMP-95 (Aminomethyl propanol: Angus Chemical

	Co.)
--	------

iv. Low-evaporation, non-toxic, highly viscous anti-icing gel with lubricant; for application by injection into all types of locks:

35 wt. %	Water
1.0 wt. %	LAPONITE® (synthetic hectorite clay: Laporte Industries, Ltd.)
2.0 wt. %	ALCOGUM® SL-70 (acrylic emulsion terpolymer: ALCO Chemical)
0.15 wt. %	PLURONIC® F108 (nonionic surfactant: BASF)
40.0 wt. %	Glycerine
20 wt. %	Propylene glycol
0.5 wt. %	Zonyl® MP 1000 (PTFE powder: DuPont)
0.5 wt. %	KELZAN® (xanthan gum: Kelco Industrial Biopolymers)
0.7 wt. %	PLURONIC® 31R1 (nonionic surfactant: BASF)
≈ 0.2 wt. %	AMP-95 (Aminomethyl propanol: Angus Chemical Co.)

Type II Formulations:

The formulations of the second basic type contain polyvinyl alcohol, and are designed to be extremely water resistant. These formulations are comprised of the
5 following components:

A. Freezing point depressant: This component will typically comprise between 30 to 70 weight percent of the total composition. The following are preferred:

- a) Two or three carbon glycols.
- 10 b) Glycerol (Glycerine, 1,2,3-propanetriol).
- c) A combination of the above.

B. Water: This component will typically comprise between 30 to 70 weight percent of the total composition. The water does not have to be distilled or purified,
15 although hard water may require pre-treatment or the addition of a sequestrant.

C. Polyvinyl alcohol: This component will typically comprise between 2 to 15 weight percent, and most typically between 6 to 10 weight percent, of the total composition.
20 Fully-hydrolyzed, gel-resistant grades are most preferred.

D. Acrylic-based emulsion polymer or copolymer, or a crosslinked homopolymers or copolymers of acrylic acid: This component is optional, and will typically comprise

between 0.1 to 10 weight percent of the total composition.
Most preferred are hydrophobically-modified compounds.

E. Polymeric water-activated thickening agent: This component is optional, and will typically comprise between
5 0.1 and 10.0 weight percent of the total composition. Preferred are polysaccharide thickeners, natural gum thickeners, marine algae colloids, and cellulose ether thickeners. Most preferred is a polysaccharide known generically as Xanthan Gum.

10 F. Hydrogen peroxide: This component is optional, and will typically comprise between 0.02 and 1.5 weight percent of the total composition. This ingredient serves to lower the viscosity of polyvinyl alcohol solutions.

15 G. pH adjusting agent: This component will typically comprise less than 0.5 weight percent of the total composition, and is, in any case, only required in an amount sufficient to adjust the pH upward to the range between 7 and 12, most preferably to between 7.5 and 10. Strong bases, such as alkaline metal hydroxides can cause damage to
20 the polyvinyl alcohol. Preferred are organic amine bases or ammonium hydroxide.

H. Corrosion inhibitors: These components are optional, and will typically comprise less than 1 weight

percent of the total composition. Corrosion inhibitors useful for use in polyol based aqueous solutions are well known in the art, and selection may be made based upon the type of surfaces which the present compositions are likely to come in contact with, and how long and under what conditions they are likely to remain on that surface.

I. Miscellaneous additives: The composition may also contain various other functional ingredients such as surfactants, anti-foaming agent, anti-oxidants, UV inhibitors, biocides, dyes, odor-modification agents, stabilizers and the like. Each of these components will typically comprise less than 1.0 weight percent of the total composition.

Examples of Type II Formulations:

Compositions produced by the aforementioned second basic formulation will set-up to form a rubber-like gel within several hours after mixing. Typically, therefore, these compositions will be made in two or more parts, which are then mixed together prior to use. An example is shown below of a three part formulation. Parts A and B are volumetrically approximately equal parts, with the ingredients listed in order of addition:

PART A:

82 wt. %	Water
0.5 wt. %	Hydrogen peroxide
0.07 wt. %	TRITON® X-100 (gel-inhibiting surfactant: Union Carbide)
17 wt. %	ELVANOL® 85-82 (polyvinyl alcohol: DuPont)
≈ 0.2 wt. %	Triethanolamine (sufficient to produce a pH of about 7-10 for the combined parts)

PART B:

99.3 wt. %	Glycerine
0.5 wt. %	Carbopol® ETD 2623 (polyacrylic acid carbomer: B.F. Goodrich)
≈ 0.2 wt. %	DREWPLUS® L-474 (foam control agent: Drew Industrial Div., Ashland Chemical)
≈ 0.02 wt. %	Any color dye to indicate whether Parts "A" and "B" are fully mixed

5

PART C:

≈ 1 % by weight	KELZAN® (xanthan gum: Kelco Industrial
-----------------	--

of Part B	Biopolymers)
-----------	--------------

Mixing Instructions for the above-described multi-part formulation:

Disperse part "C" into part "B". While stirring part
5 "A", add the "B/C" mix to part "A" and mix thoroughly.
Avoid over-mixing to minimize air entrapment.

While particular formulations have been set forth to
describe and exemplify this invention, such are not intended
10 to be limiting. Rather, it should be noted by those
ordinarily skilled in the art that the within disclosures
are exemplary only and that various other alternative
formulations may be made within the scope of the present
invention. Accordingly, the present invention is not
15 limited to the specific embodiments illustrated herein, but
is limited only by the following claims.

We claim:

1. An anti-icing composition comprising an aqueous solution of monohydroxy and/ or polyhydroxy alcohols thickened with a combination of an acrylic emulsion polymer
5 and a water-swellable, colloid-forming clay mineral.

2. The composition of claim 1 further comprising at least 1 weight percent glycerine.

3. The composition of claim 1 for use in all types of locks.

10 4. The composition of claim 1, for use in or on moving mechanisms, further comprising Teflon powder as an added ingredient.

5. The composition of claim 1, for use in or on moving mechanisms, comprising graphite as an added ingredient.

15 6. The composition of claim 1, for use in windshield washer reservoirs of trucks or automobiles.

7. The composition of claim 6, comprising non-toxic freezing point depressants.

20 8. A composition comprising an anti-icing fluid with an added surfactant combination comprising a first surfactant with an $HLB \leq 3$ coupled with a second surfactant with an HLB 19.

9. The composition of claim 8 wherein said first surfactant and said second surfactant comprise block copolymers of ethylene-oxide and propylene-oxide.

10. The composition of claim 8 wherein said anti-icing
5 fluid comprises an aqueous solution of monohydroxy and/ or polyhydroxy alcohols.

11. An anti-icing composition comprising an aqueous solution of monohydroxy and/ or polyhydroxy alcohols with a surfactant of $HLB \leq 3$ added to inhibit water incursion into
10 the composition.

12. The composition of claim 11 wherein said surfactant comprises a block copolymer of ethylene-oxide and propylene-oxide.

13. An anti-icing composition comprising an aqueous
15 solution of polyvinyl alcohol, with one polyol or a combination of polyols added to comprise at least 30 weight percent of the total composition.

14. The composition of claim 13 wherein said polyol or one of said combination of polyols comprises glycerine.

20 15. The composition of claim 13, wherein said aqueous solution of polyvinyl alcohol and said polyol or combination

of polyols are mixed together within a few hours of application.

16. The composition of claim 15, wherein said aqueous solution of polyvinyl alcohol comprises the added ingredient
5 of hydrogen peroxide, and said polyol or combination of polyols comprises the added ingredient of one or more polymeric thickening agents.

ABSTRACT OF THE DISCLOSURE:

Formulations for anti-icing compositions are of two basic types. The first basic formulation describes alcohol/polyol-based aqueous fluids thickened by the combination of an acrylic emulsion and a water-swellable layered clay mineral, with optional addition of a surfactant combination comprised of a first surfactant with an $HLB \leq 3$ coupled with a second surfactant with an $HLB \geq 19$, and further optional addition of a water-activated polymer and other components. The second basic formulation describes a polyol-based aqueous solution of polyvinyl alcohol with optional thickeners.

Please type a plus sign (+) inside this box → ☐

PTO/SB/01 (8-96)

Approved for use through 9/30/98. OMB 0851-0032

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number

**DECLARATION FOR
UTILITY OR DESIGN
PATENT APPLICATION**☒ Declaration Submitted with Initial Filing OR ☐ Declaration Submitted after Initial Filing

Attorney Docket Number	61311008
First Named Inventor	Andrews, Greg R.
COMPLETE IF KNOWN	
Application Number	
Filing Date	September 14, 2000
Group Art Unit	
Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Anti-Icing Formulations

(Title of the invention)

the specification of which

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY)

as United States Application Number or PCT International

Application Number

and was amended on (MM/DD/YYYY)

(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 (a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365 (a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority sheet attached hereto:

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.
60/154,706	09/18/1999	

[Page 1 of 3]

61311008.010

Burden Hour Statement: This form is estimated to take 0.4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner of Patents and Trademarks, Washington, DC 20231.

Please type a plus sign (+) inside this box → ☐

PTO/SB/01 (8-96)

Approved for use through 9/30/98. OMB 0851-0032

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s), or §365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

☐ Additional U.S. or PCT international application numbers are listed on a supplemental sheet attached hereto.

As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Name	Registration Number	Name	Registration Number
Barry E. Kaplan, Esq.	38,934		

☐ Additional registered practitioner(s) named on a supplemental sheet attached hereto.


Direct all correspondence to:

Name	Barry E. Kaplan, Esq.		
Address	2415 West Park Place Boulevard		
Address	Suite B		
City	Stone Mountain	State	Georgia
		ZIP	30087
Country	United States	Telephone	770-469-8887
		Fax	770-469-9099

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor:

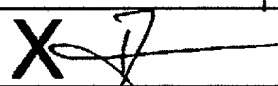
☐ A petition has been filed for this unsigned inventor

Given Name	Greg	Middle Initial	R.	Family Name	Andrews	Suffix e.g. Jr.	
Inventor's Signature					Date	9/14/00	
Residence: City	Middletown	State	CT	Country	United States	Citizenship	U.S.A.
Post Office Address	70 Home Avenue, Second Floor						
Post Office Address							
City	Middletown	State	CT	ZIP	06457	Country	United States

☒ Additional inventors are being named on supplemental sheet(s) attached hereto

Please type a plus sign (+) inside this box → ☐

PTO/SB/01 (8-96)
 Approved for use through 9/30/98. OMB 0651-0032
 Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
 Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION				ADDITIONAL INVENTOR(S) Supplemental Sheet			
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name	Robert	Middle Initial	S.	Family Name	Mendenhall	Suffix e.g., Jr.	
Inventor's Signature					Date	X 9/14/2000	
Residence: City	Middletown	State	CT	Country	United States	Citizenship	U.S.A.
Post Office Address		9 Brainard Avenue					
Post Office Address							
City	Middletown	State	CT	Zip	06457	Country	United States
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name		Middle Initial		Family Name		Suffix e.g., Jr.	
Inventor's Signature					Date		
Residence: City		State		Country		Citizenship	
Post Office Address							
Post Office Address							
City		State		Zip		Country	
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name		Middle Initial		Family Name		Suffix e.g., Jr.	
Inventor's Signature					Date		
Residence: City		State		Country		Citizenship	
Post Office Address							
Post Office Address							
City		State		Zip		Country	
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name		Middle Initial		Family Name		Suffix e.g., Jr.	
Inventor's Signature					Date		
Residence: City		State		Country		Citizenship	
Post Office Address							
Post Office Address							
City		State		Zip		Country	

☐ Additional inventors are being named on supplemental sheet(s) attached hereto